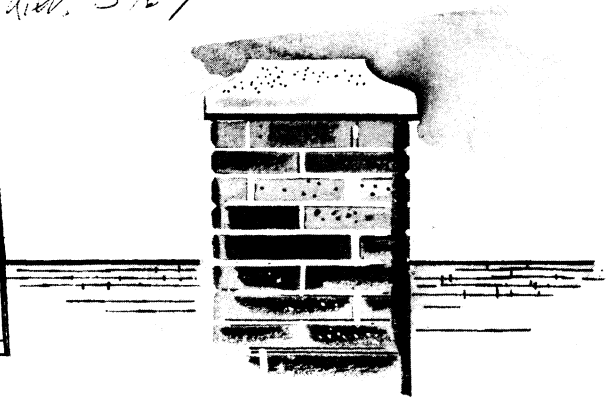
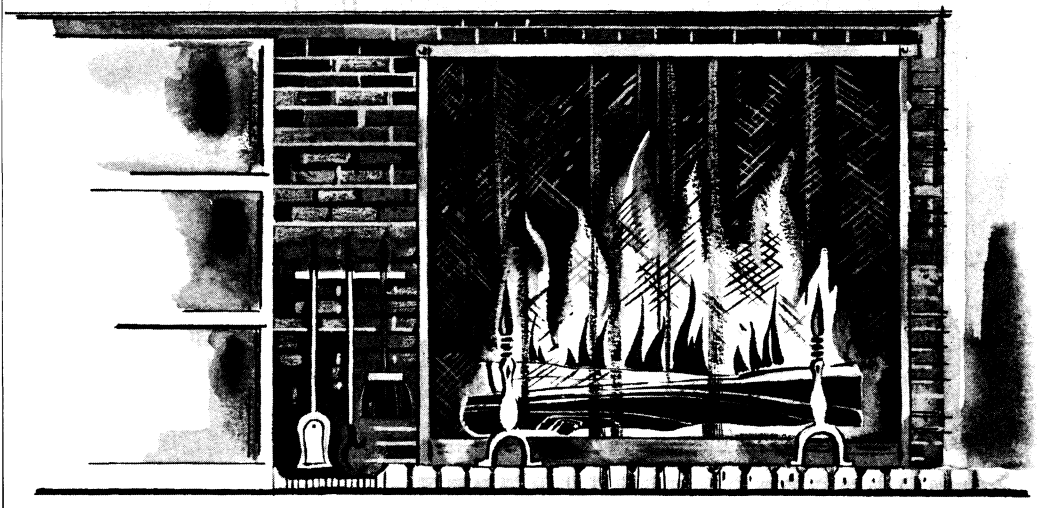


FIREPLACES and CHIMNEYS



Farmers' Bulletin No. 1889

U.S. DEPARTMENT OF AGRICULTURE

PROPER CONSTRUCTION of chimneys and fireplaces is essential for safe, efficient operation. Therefore, it is recommended that they be designed and built by persons experienced in that type of work.

The homeowner should have a working knowledge of chimney and fireplace construction so that he can assist in the designing, follow the work closely, and properly inspect and maintain the completed unit.

Each year, the U.S. Department of Agriculture receives thousands of requests for information on construction of fireplaces and chimneys. In an effort to comply with these requests, the Department has prepared this revision of Farmers' Bulletin 1889.

CONTENTS

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FIREPLACES and CHIMNEYS

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CHIMNEYS

All fireplaces and fuel-burning equipment such as stoves and furnaces require some type of chimney (fig. 1). The chimney must be designed and built so that it produces sufficient draft to supply an adequate quantity of fresh air to the fire and to expel smoke and gases emitted by the fire or equipment.

A chimney located entirely inside a building has better draft than an exterior chimney, because the masonry retains heat longer when protected from cold outside air.

Construction

Flue Size

The flue is the passage in the chimney through which the air, gases, and smoke travel.

Proper construction of the flue is important. Its size (area), height, shape, tightness, and smoothness determine the effectiveness of the chimney in producing adequate draft and in expelling smoke and gases. Soundness of the flue walls may determine the safety of the building should a fire occur in the chimney. Overheated or defective flues are one of the chief causes of house fires.

Manufacturers of fuel-burning equipment usually specify chimney requirements, including flue dimensions, for their equipment. Follow their recommendations.

Height

A chimney should extend at least 3 feet above flat roofs and at least 2 feet above a roof ridge or raised part of a roof within 10 feet of the chimney. A hood (fig. 2, *C*) should be provided if a chimney cannot be built high enough above a ridge to prevent trouble from eddies caused by wind being deflected from the roof. The open ends of the hood should be parallel to the ridge.

Low-cost metal-pipe extensions are sometimes used to increase flue height, but they are not as durable or as attractive as terra cotta chimney pots or extensions. Metal extensions must be securely anchored against the wind and must have the same cross-sectional area as the flue. They are available with a metal cowl or top that turns with the wind to prevent air from blowing down the flue.

[1] Retired.

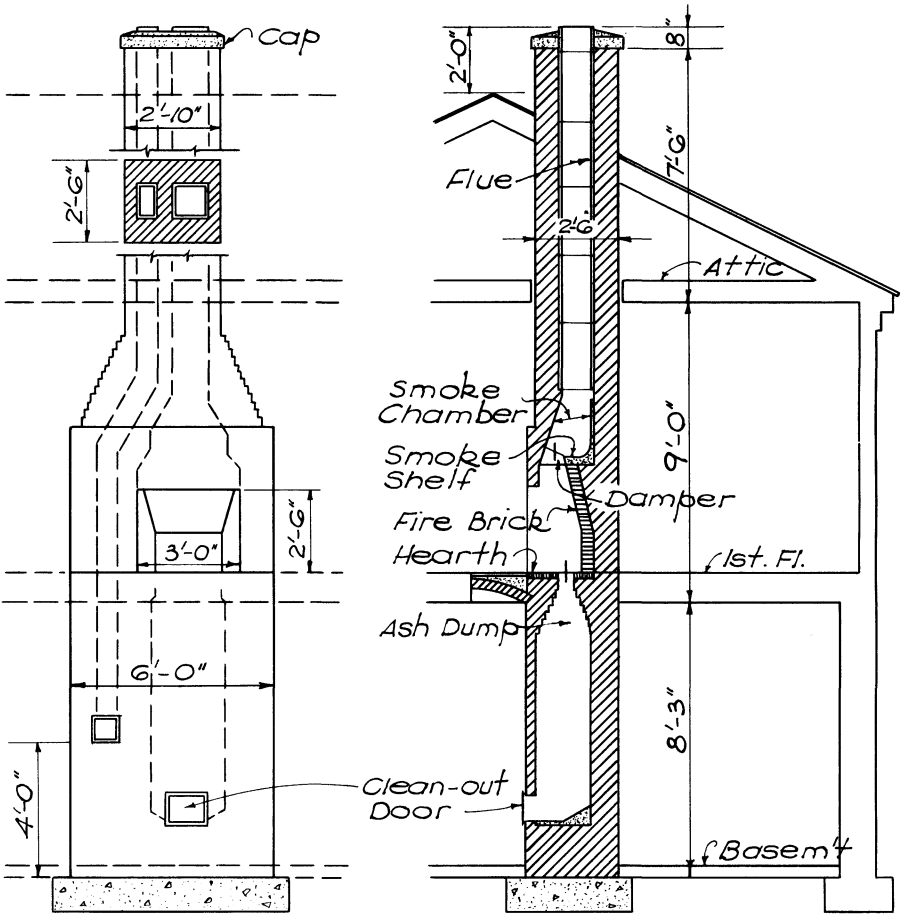


***Figure 1.*—Diagram of an entire chimney such as is commonly built to serve the house-heating unit and one fireplace.**

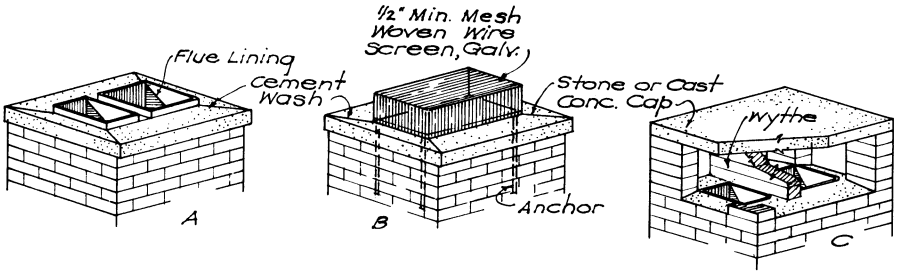


***Figure 2.*—Top construction of chimneys. *A*, Good method of finishing top of chimney; flue lining extends 4 inches above cap. *B*, Spark arrester or bird screen. *C*, Hood to keep out rain.**

Support

The chimney is usually the heaviest part of a building and it must rest on a solid foundation to prevent differential settlement in the building.

Concrete footings are recommended. They must be designed to distribute the load over an area wide enough to avoid exceeding the safe load-bearing capacity of the soil. They should extend at least 6 inches beyond the chimney on all sides and should be 8 inches thick for one-story houses and 12 inches thick for two-story houses having basements.

If there is no basement, pour the footings for an exterior chimney on solid ground below the frostline.

If the house wall is of solid masonry at least 12 inches thick, the chimney can be built integrally with the wall and, instead of being carried down to the ground, it can be offset from the wall enough to provide flue space by corbelling. The offset should not extend more than 6 inches from the face of the wall—each course projecting not more than 1 inch—and should be not less than 12 inches high.

Chimneys in frame buildings should be built from the ground up, or they can rest on the building foundation or basement walls if the walls are of solid masonry 12 inches thick and have adequate footings.

Local codes may call for slightly different construction of fireplaces and chimneys than is given in this bulletin. In such cases, local code requirements should be followed.

Flue Lining

Chimneys are sometimes built without flue lining to reduce cost, but those with lined flues are safer and more efficient.

Lined flues are definitely recommended for brick chimneys. When the flue is not lined, mortar and bricks directly exposed to the action of flue gases disintegrate. This disintegration plus that caused by temperature changes can open cracks in the masonry, which will reduce the draft and increase the fire hazard.

Flue lining must withstand rapid fluctuations in temperature and the action of flue gases. Therefore, it should be made of vitrified fire clay at least five-eighths of an inch thick.

Both rectangular- and round-shaped linings are available. Rectangular lining is better adapted to brick construction, but round lining is more efficient.

Each length of lining should be placed in position—set in cement mortar with the joint struck smooth on the inside—and then the brick laid around it. If the lining is slipped down after several courses of brick have been laid, the joints cannot be filled and leakage will occur. In masonry chimneys with walls less than 8 inches thick, there should be space between the lining and the chimney walls. This space should not be filled with mortar. Use only enough mortar to make good joints and to hold the lining in position.

Unless it rests on solid masonry at the bottom of the flue, the lower section of lining must be supported

on at least three sides by brick courses projecting to the inside surface of the lining. This lining should extend to a point at least 8 inches under the smoke pipe thimble.

Flues should be as nearly vertical as possible. If a change in direction is necessary, the angle should never exceed 45° (fig. 3). An angle of 30° or less is better, because sharp turns set up eddies which affect the motion of smoke and gases. Where a flue does change directions the lining joints should be made tight by mitering or cutting equally the ends of the adjoining sections. Cut the lining before it is built into the chimney; if cut after, it may break and fall out of place. To cut the lining, stuff a sack of damp sand into it and then tap a sharp chisel with a light hammer along the desired line of cut.

When laying lining and brick, draw a tight-fitting bag of straw up the flue as the work progresses to catch material that might fall and block the flue.

Walls

Walls of chimneys with lined flues and not more than 30 feet high should be at least 4 inches thick if made of brick or reinforced concrete and at least 12 inches thick if made of stone.

Flue lining is recommended, especially for brick chimneys, but it can be omitted if the chimney walls are made of reinforced concrete at least 6 inches thick or of unreinforced concrete or brick at least 8 inches thick.

A minimum thickness of 8 inches is recommended for the outside

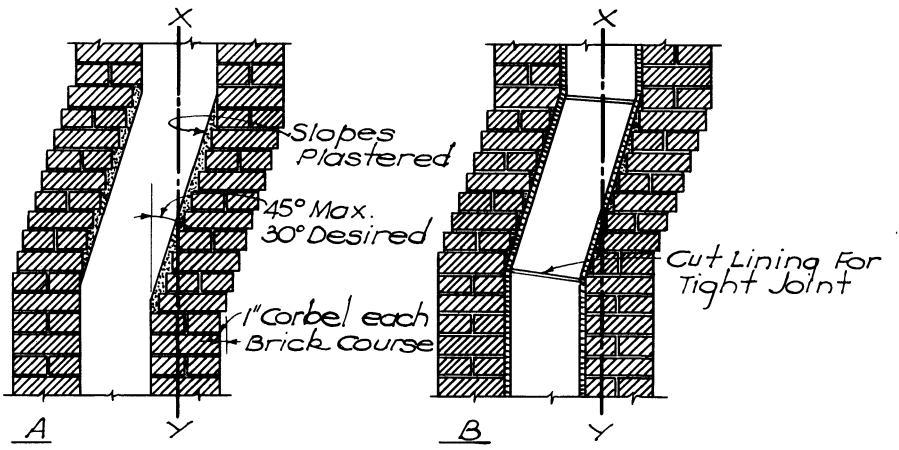


Figure 3.—**Offset in a chimney. For structural safety the amount of offset must be limited so that the center line, XY, of the upper flue will not fall beyond the center of the wall of the lower flue. *A*, Start the offset of the left wall of an unlined flue two brick courses higher than the right wall so that the area of the sloping section will not be reduced after plastering. *B*, Method of cutting lining to make a tight joint.**

wall of a chimney exposed to the weather.

Brick chimneys that extend up through the roof may sway enough in heavy winds to open up mortar joints at the roof line. Openings to the flue at that point are dangerous, because sparks from the flue may start fires in the woodwork or roofing. A good practice is to make the upper walls 8 inches thick by starting to offset the bricks at least 6 inches below the underside of roof joists or rafters (fig. 4).

Chimneys may contain more than one flue. Building codes generally require a separate flue for each fireplace, furnace, or boiler. If a chimney contains three or more lined flues, each group of two flues must be separated from the other single flue or group of two flues by brick divisions or wythes at least 3¾ inches thick (fig. 5). Two flues grouped together without a dividing wall should have the lining joints staggered at least 7 inches and the

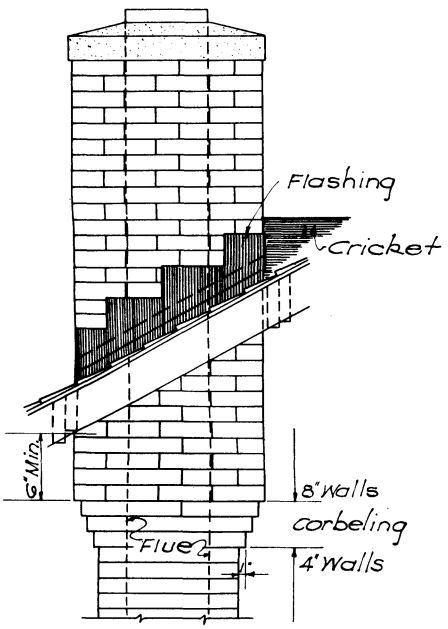


***Figure 4.*—Corbelling of chimney to provide 8-inch walls for the section exposed to the weather.**

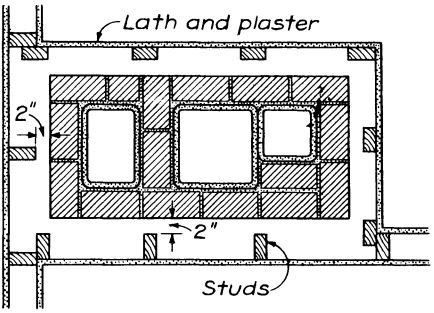


***Figure 5.*—Plan of chimney showing proper arrangement of three flues. Bond division wall with sidewalls by staggering the joints of successive courses. Wood framing should be at least 2 inches from brickwork.**

MORTAR

Brickwork around chimney flues and fireplaces should be laid with cement mortar; it is more resistant to the action of heat and flue gases than lime mortar.

A good mortar to use in setting flue linings and all chimney masonry, except firebrick, consists of 1 part portland cement, 1 part hydrated lime (or slaked-lime putty), and 6 parts clean sand, measured by volume.

Firebrick should be laid with fire clay.

Each summer when they are not in use, smoke pipes should be taken down, cleaned, wrapped in paper, and stored in a dry place.

When not in use, smoke-pipe holes should be closed with tight-fitting metal flue stops. Do not use papered tin. If a pipe hole is to be abandoned, fill it with bricks laid in good mortar. Such stopping can be readily removed if necessary.

Insulation

No wood should be in contact with the chimney. Leave a 2-inch space (fig. 5) between the chimney walls and all wooden beams or joists (unless the walls are of solid masonry 8 inches thick, in which case the framing can be within one-half inch of the chimney masonry).

Fill the space between wall and floor framing with porous, nonmetallic, incombustible material, such as loose cinders (fig. 8). Do not use brickwork, mortar, or concrete. Place the filling before the floor is laid, because it not only forms a firestop but also prevents the accumulation of shavings or other combustible material.

Flooring and subflooring can be laid within three-fourths inch of the masonry.

Wood studding, furring, or lathing should be set back at least 2 inches from chimney walls. (Plaster can be applied directly to the masonry or to metal lath laid over the masonry, but this is not recommended because settlement of the chimney may crack the plaster.) A coat of cement plaster should be applied to chimney walls that will

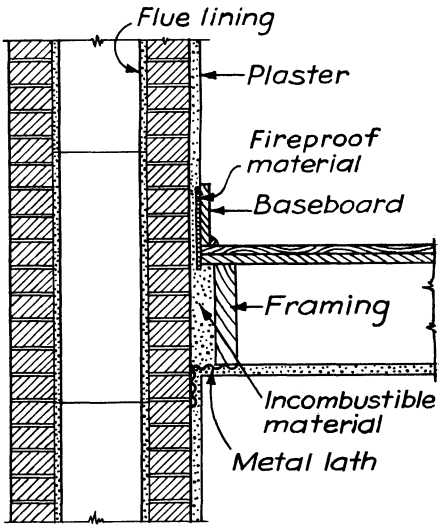


***Figure 8.*—Method of insulating wood floor joists and baseboard at a chimney.**

be encased by wood partition or other combustible construction.

If baseboards are fastened to plaster that is in direct contact with the chimney wall, install a layer of fireproof material, such as asbestos, at least one-eighth inch thick between the baseboard and the plaster (fig. 8).

Connection With Roof

Where the chimney passes through the roof, provide a 2-inch clearance between the wood framing and the masonry for fire protection and to permit expansion due to temperature changes, settlement, and slight movement during heavy winds.

Chimneys must be flashed and counterflashed to make the junction with the roof watertight (figs. 9 and 10). When the chimney is located on the slope of a roof, a

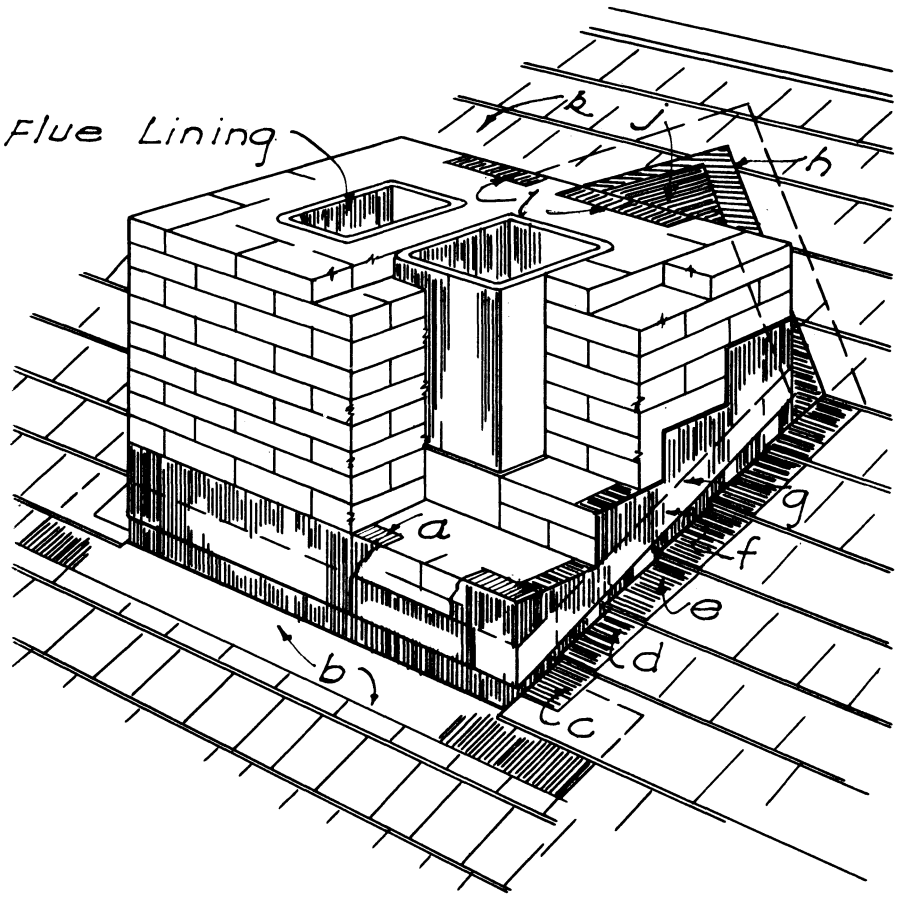


Figure 9.—**Flashing at a chimney located on the slope of a roof. Sheet metal (*h*), over cricket (*j*), extends at least 4 inches under the shingles (*k*), and is counterflashed at *l* in joint. Base flashings (*b*, *c*, *d*, and *e*) and cap flashings (*a*, *f*, and *g*) lap over the base flashings to provide watertight construction. A full bed of mortar should be provided where cap flashing is inserted in joints.**

cricket (*j*, fig. 9) is built as shown in figure 11 high enough to shed water around the chimney. Corrosion-resistant metal, such as copper, zinc, or lead, should be used for flashing. Galvanized or tinned sheet steel requires occasional painting.

Top Construction

Figure 2, *A* shows a good method of finishing the top of the chimney. The flue lining extends at least 4 inches above the cap or top course of brick and is surrounded by at least 2 inches of cement mortar. The mortar is finished with a

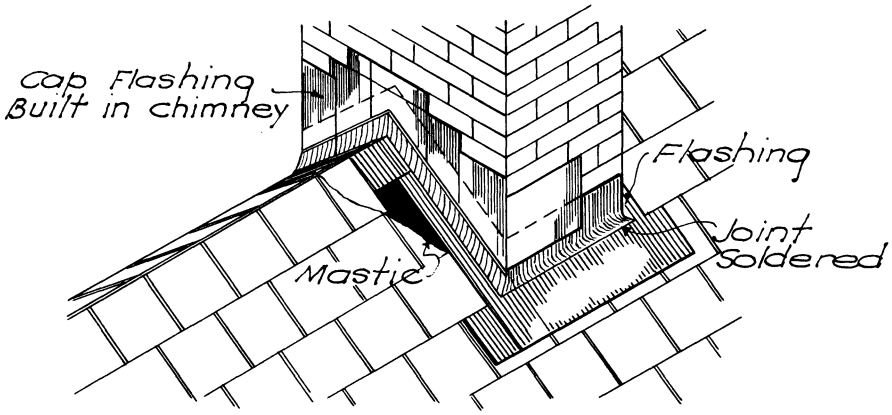


Figure 10.—Flashing at a chimney located on a roof ridge.

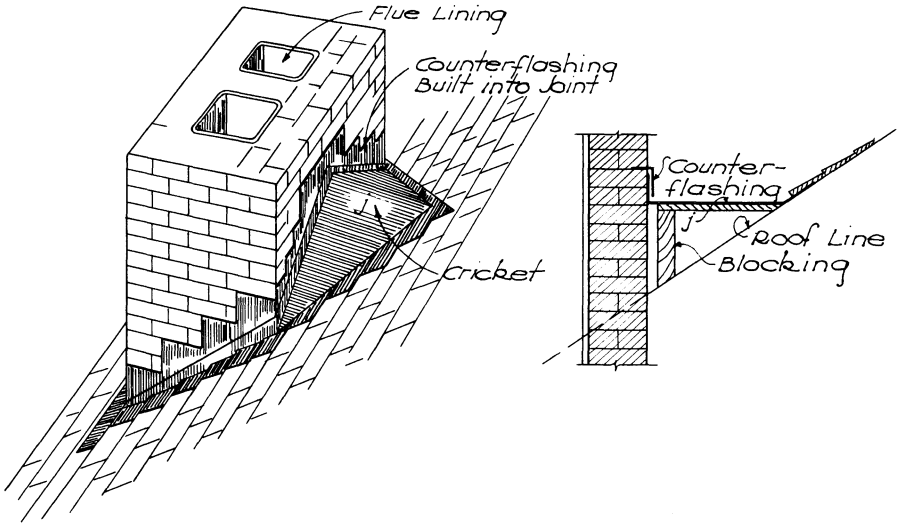


Figure 11.—Construction of a cricket (*j*, fig. 9) behind a chimney.

straight or concave slope to direct air currents upward at the top of the flue and to drain water from the top of the chimney.

Hoods (fig. 2, *C*) are used to keep rain out of chimneys and to prevent downdraft due to nearby buildings, trees, or other objects. Common types are the arched brick hood and the flat-stone or cast-concrete cap. If the hood covers more than one flue, it should be divided by wythes so that each flue has a separate section. The area of the hood opening for each flue must be larger than the area of the flue.

Spark arresters (fig. 2, *B*) are recommended when burning fuels

that emit sparks, such as sawdust, or when burning paper or other trash. They may be required when chimneys are on or near combustible roofs, woodland, lumber, or other combustible material. They are not recommended when burning soft coal, because they may become plugged with soot.

Spark arresters do not entirely eliminate the discharge of sparks, but if properly built and installed, they greatly reduce the hazard. They should be made of rust-resistant material and should have screen openings not larger than five-eighths inch nor smaller than five-sixteenths inch. (Commercially made screens that generally last for several years are available.) They should completely enclose the flue discharge area and must be securely fastened to the top of the chimney. They must be kept adjusted in position and they should be replaced when the screen openings are worn larger than normal size.

Maintenance

Inspection

Chimneys should be inspected every fall for tightness and defects. Tightness can be checked by the smoke test (p. 9). Check for loose or fallen bricks, cracked or broken flue lining, and excessive soot accumulation by lowering an electric light into the flue. Mortar joints can be tested from the outside by prodding with a knife.

If inspection shows defects that cannot be readily repaired or reached for repair, you should tear the masonry down and rebuild properly. Do not use the old bricks that have been impregnated with soot and creosote in the new work, because they will stain plaster whenever dampness occurs. Soot and creosote stains are almost impossible to remove.

Cleaning

Chimney cleaning usually is not necessary in the average home. But should it become necessary, vacuuming by a commercial cleaning firm is the best and cleanest method.

If there is not too great an offset in the chimney, you can dislodge soot and loose material by pulling a weighted sack of straw up and down in the flue. Seal the front of a fireplace when cleaning the flue to keep soot out of the room.

Chemical soot removers are not particularly recommended. They are not very effective in removing soot from chimneys and they cause soot to burn, which creates a fire hazard. Some, if applied to soot at high temperatures and in sufficient quantity, may produce uncontrollable combustion and even an explosion. Common rock salt is not the most effective remover, but it is widely used, because it is cheap, readily available, and easy to handle. Use 2 or 3 teacupfuls per application.

Creosote may form in chimneys, especially when wood is burned and in cold weather. It is very hard to remove. The only safe method is to chip it from the masonry with a blade, and you must be careful not to knock out mortar joints or damage the flue lining.

FIREPLACES

Fireplaces are not an economical means of heating. And tests indicate that, as ordinarily constructed, they are only about one-third as efficient as a good stove or circulator heater.

However, a well-designed, properly built fireplace can—

- Provide additional heat.
- Provide all the heat necessary in mild climates.
- Enhance the appearance and comfort of the room.
- Burn as fuel certain combustible materials that otherwise might be wasted—for example, coke, briquets, and scrap lumber.

Design

Varied fireplace designs are possible. Figures 12, 13, and 14 show well-designed units. Commercial publications frequently feature articles on fireplace design and construction.

A fireplace should harmonize in detail and proportion with the room in which it is located, but safety and utility should not be sacrificed for appearance.

N–47247

Figure 12.—A well-designed, attractive fireplace.

N—47244

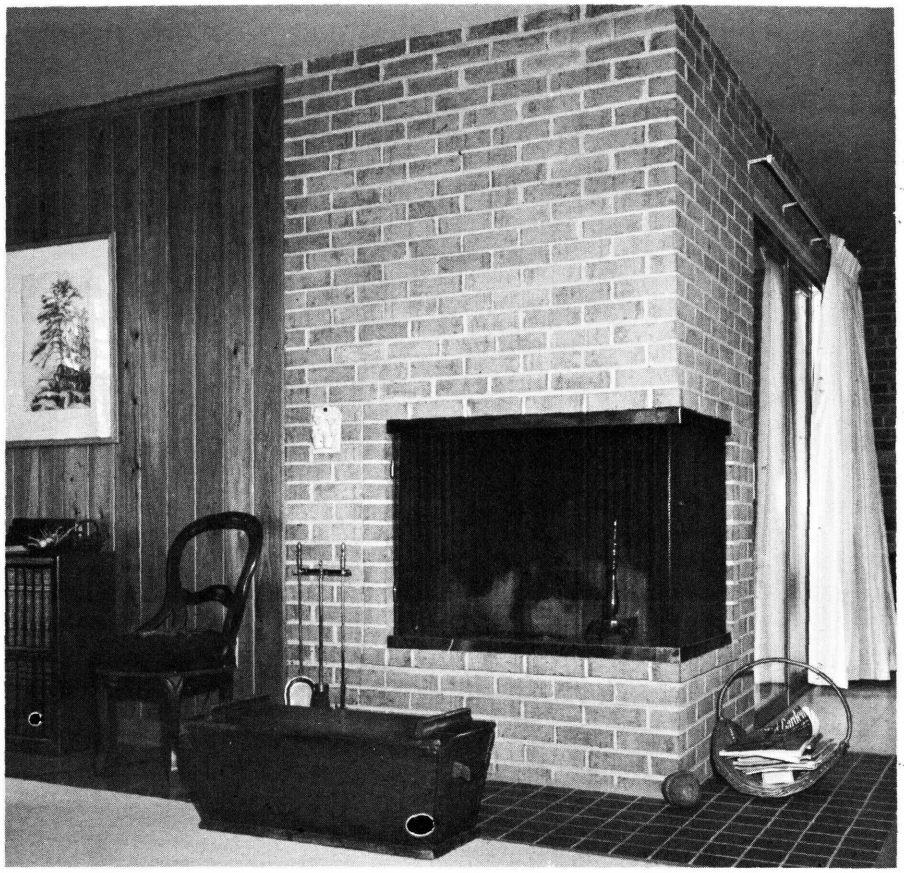
***Figure 13.*—An extended mantel and built-in storage areas enhance the appearance of this fireplace.**

Location of the fireplace within a room will depend on the location of the existing chimney or the best location from the standpoint of safe construction for the proposed chimney. A fireplace should not be located near doors.

Fireplace openings are usually made from 2 to 6 feet wide. The kind of fuel to be burned can suggest a practical width. For example, where cordwood (4 feet long) is cut in half, an opening 30 inches wide is desirable; but where coal is burned, a narrower opening can be used.

Height of the opening can range from 18 inches for an opening 2 feet wide to 28 inches for one that is 6 feet wide. The higher the opening, the more chance of a smoky fireplace.

In general, the wider the opening, the greater the depth. A shallow opening throws out relatively more heat than a deep one, but holds smaller pieces of wood. You have the choice, therefore, between a deeper opening that holds larger, longer-burning logs and a shallower one that takes smaller pieces of



N–47246

Figure 14.—**This attractive fireplace well illustrates the variations in design possible. The basket of magazines at the right is too close to the fireplace and could be a fire hazard.**

wood, but throws out more heat. In small fireplaces, a depth of 12 inches may permit good draft, but a minimum depth of 16 inches is recommended to lessen the danger of brands falling out on the floor. Suitable screens should be placed in front of all fireplaces to minimize the danger from brands and sparks.

Second-floor fireplaces are usually made smaller than first-floor ones, because of the reduced flue height.

Construction

Fireplace construction is basically the same regardless of design. Figure 15 shows construction of a typical fireplace. The table on page 19 gives recommended dimensions for essential parts or areas of fireplaces of various sizes.

Footings

Foundation - and - footing construction for chimneys with fire-

places is similar to that for chimneys without fireplaces (p. 5). Be sure the footings rest on good firm soil below the frostline.

Hearth

The fireplace hearth should be made of brick, stone, terra cotta, or reinforced concrete at least 4 inches thick. It should project at least 20 inches from the chimney breast and should be 24 inches wider than the fireplace opening (12 inches on each side).

The hearth can be flush with the floor so that sweepings can be brushed into the fireplace or it can be raised. Raising the hearth to various levels and extending in length as desired is presently common practice, especially in contemporary design. If there is a basement, a convenient ash dump can be built under the back of the hearth (fig. 16).

In buildings with wooden floors, the hearth in front of the fireplace should be supported by masonry trimmer arches or other fire-resistant construction (fig. 15). Wood centering under the arches used during construction of the hearth and hearth extension should be removed when construction is completed.

Figure 17 shows the recommended method of installing floor framing around the hearth.

Walls

Building codes generally require that the back and sides of fireplaces be constructed of solid masonry or reinforced concrete at least 8 inches thick and be lined with firebrick or other approved noncombustible material not less than 2 inches thick or steel lining not less than one-fourth inch thick. Such lining may be omitted when the walls are of solid masonry or reinforced concrete at least 12 inches thick.

Jambs

The jambs of the fireplace should be wide enough to provide stability and to present a pleasing appearance.

For a fireplace opening 3 feet wide or less, the jambs can be 12 inches wide if a wood mantel will be used or 16 inches wide if they will be of exposed masonry. For wider fireplace openings, or if the fireplace is in a large room, the jambs should be proportionately wider.

Fireplace jambs are frequently faced with ornamental brick or tile.

No woodwork should be placed within 6 inches of the fireplace opening. Woodwork above and projecting more than 1½ inches from the fireplace opening should be placed not less than 12 inches from the top of the fireplace opening.

Lintel

A lintel must be installed across the top of the fireplace opening to support the masonry.

For fireplace openings 4 feet wide or less, ½- by 3-inch flat steel bars, 3½- by 3½- by ¼-inch angle irons, or specially designed damper frames may be used. Wider openings will require heavier lintels.

If a masonry arch is used over the opening, the fireplace jambs must be heavy enough to resist the thrust of the arch.

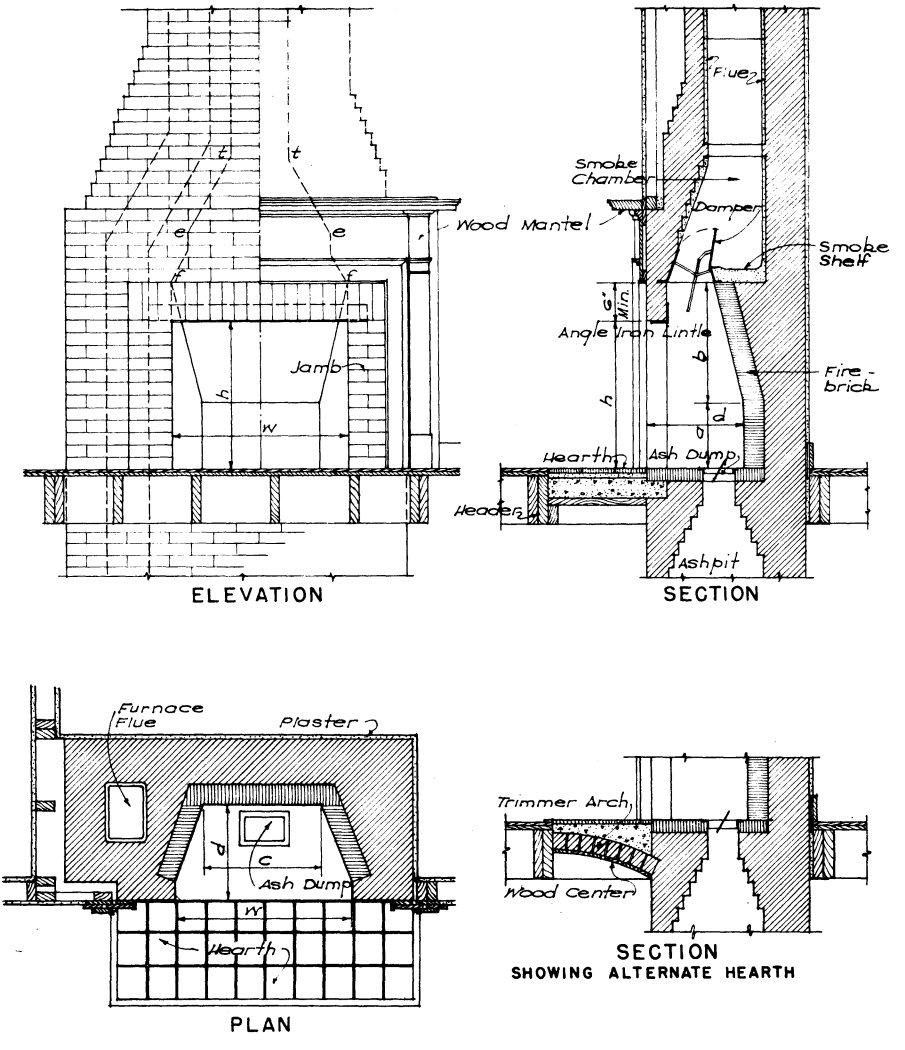


Figure 15.—**Construction details of a typical fireplace. (The letters indicate specific features discussed in the text). The lower right-hand drawing shows an alternate method of supporting the hearth.**

Recommended dimensions for fireplaces and size of flue lining required

[Letters at heads of columns refer to fig. 15]

Size of fireplace opening		Depth	Minimum width of back wall	Height of vertical back wall	Height of inclined back wall	Size of flue lining required	
Width *w*	Height *h*	*d*	*c*	*a*	*b*	Standard rectangular (outside dimensions)	Standard round (inside diameter)
Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
24	24	16–18	14	14	16	8½ x 8½	10
28	24	16–18	14	14	16	8½ x 8½	10
30	28–30	16–18	16	14	18	8½ x 13	10
36	28–30	16–18	22	14	18	8½ x 13	12
42	28–32	16–18	28	14	18	13 x 13	12
48	32	18–20	32	14	24	13 x 13	15
54	36	18–20	36	14	28	13 x 18	15
60	36	18–20	44	14	28	13 x 18	15
54	40	20–22	36	17	29	13 x 18	15
60	40	20–22	42	17	30	18 x 18	18
66	40	20–22	44	17	30	18 x 18	18
72	40	22–28	51	17	30	18 x 18	18

Throat

Proper construction of the throat area (*ff*, fig. 15) is essential for a satisfactory fireplace.

The sides of the fireplace must be vertical up to the throat, which should be 6 to 8 inches or more above the bottom of the lintel.

Area of the throat must be not less than that of the flue—length must be equal to the width of the fireplace opening and width will depend on the width of the damper frame (if a damper is installed).

Five inches above the throat (at *ee*, fig. 15), the sidewalls should start sloping inward to meet the flue (at *tt*, fig. 15).

Damper

A damper consists of a cast-iron frame with a hinged lid that opens or closes to vary the throat opening.

Dampers are not always installed, but they are definitely recommended, especially in cold climates. With a well-designed, properly installed damper, you can—

- Regulate the draft.
- Close the flue to prevent loss of heat from the room when there is no fire in the fireplace.
- Adjust the throat opening according to the type of fire to reduce loss of heat. For example, a roaring pine fire may require a full throat opening, but a slow-burning hardwood log fire may require an opening of only 1 or 2 inches. Closing the damper to that opening will reduce loss of heat up the chimney.
- Close or partially close the flue to prevent loss of heat from the main heating system. When air heated by a furnace goes up a chimney, an excessive amount of fuel may be wasted.
- Close the flue in the summer to prevent insects from entering the house through the chimney.

Dampers of various designs are on the market. Some are designed

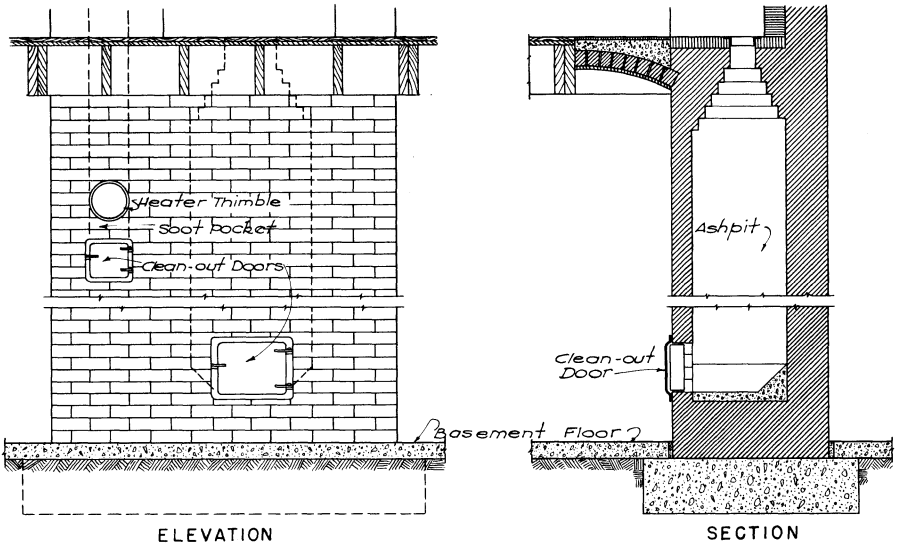


***Figure 16.*—An ashpit for a fireplace should be of tight masonry and should be provided with a tightly fitting iron cleanout door and frame 10 inches high and 12 inches wide. The left-hand drawing also shows a clean-out for a furnace flue.**

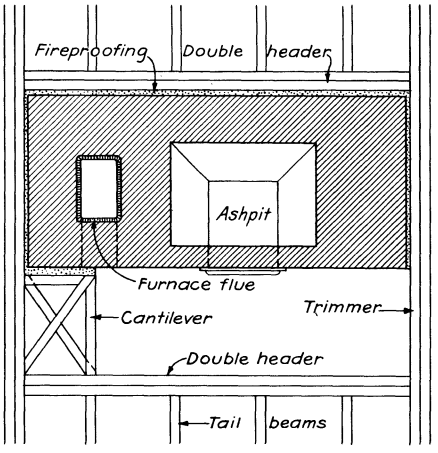


***Figure 17.*—Installation of floor framing around a chimney and hearth. Where a header is more than 4 feet long, it should be doubled as shown. If it supports more than four tail beams, its ends should be supported in metal joists hangers. The framing may be placed one-half inch from masonry chimney walls 8 inches thick.**

to support the masonry over fireplace openings, thus replacing ordinary lintels.

Responsible manufacturers of fireplace equipment usually offer assistance in selecting a suitable damper for a given-size fireplace. It is important that the full damper opening equal the area of the flue.

Smoke Shelf and Chamber

A smoke shelf (fig. 15) prevents downdraft. It is made by setting the brickwork at the top of the throat back to the line of the flue wall for the full length of the throat. Depth of the shelf may be 6 to 12 inches or more, depending on the depth of the fireplace.

The smoke chamber is the area from the top of the throat (*ee*, fig. 15) to the bottom of the flue (*tt*, fig. 15). As indicated under "Throat" (p. 19), the sidewalls should slope inward to meet the flue.

The smoke shelf and the smoke-chamber walls should be plastered with cement mortar at least one-half inch thick.

Flue

Proper proportion between the size (area) of the fireplace opening, size (area) of the flue, and height of the flue is essential for satisfactory operation of the fireplace.

The area of a lined flue 22 feet high should be at least one-twelfth of the area of the fireplace opening. The area of an unlined flue or a flue less than 22 feet high should be one-tenth of the area of the fireplace opening.

The table on page 19 lists dimensions of fireplace openings and, in the last two columns, indicates the size of flue lining required. From this table, you can determine the size of lining required for a given-size fireplace opening and also the size of opening to use with an existing flue.

Flue-construction principles given under "Chimneys" (p. 3) apply also to fireplace flues.

Modified Fireplaces

Modified fireplaces are manufactured fireplace units, made of heavy metal and designed to be set in place and concealed by the usual brickwork or other construction. They contain all the essential fireplace parts—firebox, damper, throat, and smoke shelf and chamber. In the completed installation, only grilles show. Figure 18 shows one of the several designs of modified fireplaces available.

Modified fireplaces offer two advantages:

- The correctly designed and proportioned firebox provides a ready-made form for the masonry, which reduces the chance of faulty construction and assures a smokeless fireplace.
- When properly installed, the better designed units heat more efficiently than ordinary fireplaces.

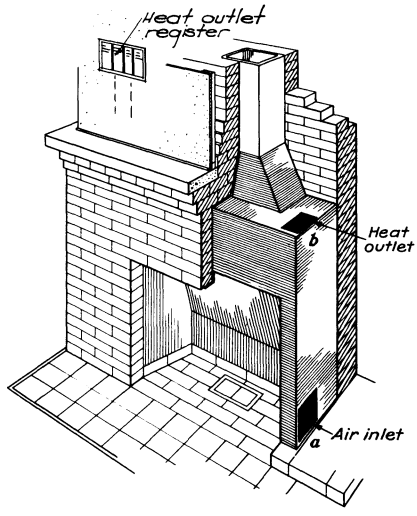


***Figure 18.*—A modified fireplace. Air is drawn through inlet *a* from the room being heated. It is heated by contact with the metal sides and back of the fireplace, rises by natural circulation, and is discharged though outlet *b*. The inlets and outlets are connected to registers which may be located at the front (as shown) or ends of the fireplace or on the wall of an adjacent or second-story room.**

They circulate heat into the cold corners of rooms and can deliver heated air through ducts to upper or adjoining rooms.

The use of a modified fireplace unit can increase the cost of a fireplace (although manufacturers claim that labor, materials, and fuel saved offset any additional cost). It should not be necessary to use one merely to insure an attractive, well-proportioned fireplace; you can build an equally attractive and satisfactory masonry fireplace by careful construction.

Even a well-designed modified fireplace unit will not operate properly if the chimney is inadequate. Therefore, proper chimney construction is as important for these units as it is for ordinary fireplaces.

Smoky Fireplaces

Fallen bricks in the chimney blocking the flue, loose mortar joints, or nearby trees or tall structures causing eddies down the flue may cause a smoky fireplace.

An undersized flue may also cause a smoky fireplace. Installation of a metal hood across the top of the fireplace opening so as to reduce the area of the opening may eliminate the smoking.

PREFABRICATED FIREPLACES AND CHIMNEYS

Prefabricated fireplace and chimney units—all parts needed for a complete fireplace-to-chimney installation—are on the market (fig. 19).

Such units offer these features:

- Wide selection of styles, shapes, and colors.
- Pretested design that is highly efficient in operation.
- Easy and versatile installation —can be installed freestanding or flush against a wall in practically any part of a house.
- Light in weight.
- Lower cost than comparable masonry units.

The basic part of the prefabricated fireplace is a specially insulated metal firebox shell. Since it is light in weight, it can be set directly on the floor without the heavy footing required for masonry fireplaces.

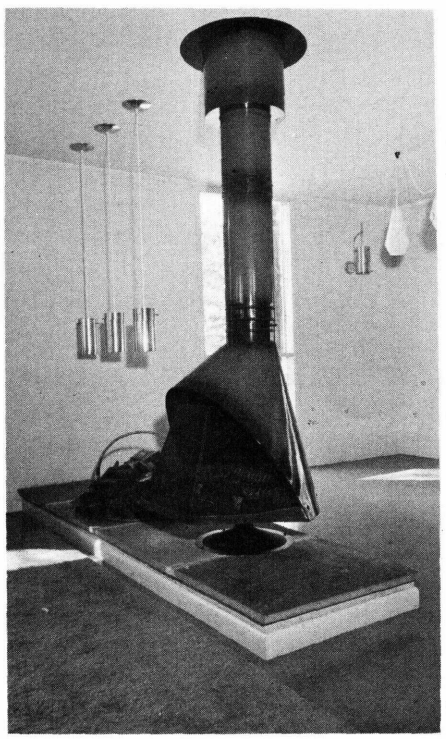


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***Figure 19.*—Prefabricated fireplace.**

Prefabricated chimneys can be used for furnaces, heaters, and incinerators as well as for prefabricated fireplaces. The chimneys are tested and approved by Underwriters' Laboratories, Inc., and other nationally recognized testing laboratories, and are rapidly being accepted for use by building codes in many communities.

OUTDOOR FIREPLACES

Outdoor fireplaces range from simple makeshift units to elaborate structures designed to harmonize with and enhance the appearance of the house and the landscape.

Plans for outdoor fireplaces are available from various sources. Magazines frequently feature articles on outdoor-fireplace design and construction.

If the fireplace is to be built with local labor and material, a relatively simple design, such as that shown in figure 20, is advisable.

Built-in features, such as ovens, cranes, grilles, storage compartments, sinks, and benches, add to the appearance and convenience of fireplaces. Dealers in outdoor-fireplace equipment usually have catalogs listing types and sizes of accessory equipment.

Elaborately designed fireplaces that include many built-in features or that are an integral part of a building should be built by skilled labor.

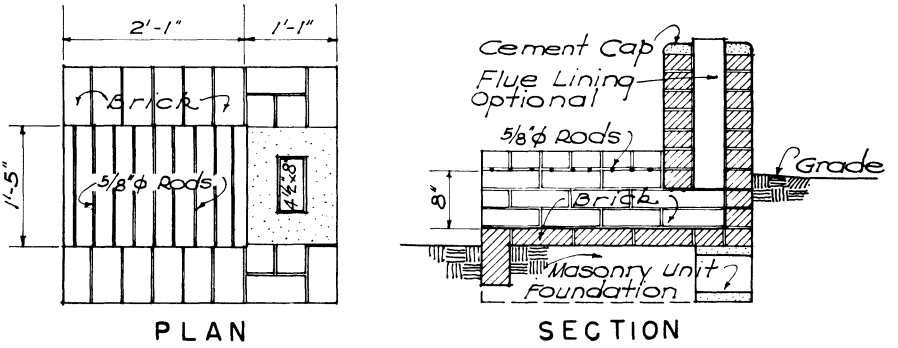

***Figure 20.*—An outdoor fireplace of modest design.**

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Protect Your Family and Farm from FIRE

Repair defective chimneys, spark arresters, flues, stovepipes, and heating and cooking equipment.

Store gasoline and other flammables in approved containers and locations.

Remove fire hazards from storage areas.

Be sure electric wiring is safe and adequate . . . electric circuits are fused properly . . . electric equipment is in good repair.

See that lightning rods are properly grounded. Use properly grounded arresters on radio and television antennas.

Keep matches and chemicals away from children.

Have fire-fighting equipment ready.

FIRE---Hard to stop! Easy to prevent!